Periscope.

ANATOMY.

Ueber die Verbindung der sensibeln Nerven mit dem Zwischenhirn. The Central Tracts of the Sensory Cranial Nerves. L. EDINGER. (*Anatomischer Anzeiger*, No. 6, 1887, Separat Abdruck.)

Edinger has investigated the central tracts connecting the V., VIII., IX., and X. nerve nuclei with the tween-brain, in fœtal specimens from cats, dogs, calves, rabbits, and apes. He is the first to follow the method of Flechsig into the domain of comparative anatomy, and the interesting results demonstrate the value of this method of investigation. Fibres which leave the nuclei of the sensory cranial nerves cross to the opposite side of the medulla or pons, forming part of the transverse fibres (bogenfasern) of these parts, and on reaching the lemniscus and formatio reticularis turn upward (cephalad) to pass to the brain. They decussate with their fellows in the raphé, usually near to the area occupied by the posterior longitudinal bundle. It is thus evident that the nuclei of the sensory nerves, like the nuclei of the posterior columns of the spinal cord (nuclei gracilis et cuneatus), are connected with the opposite side of the formatio reticularis and lemniscus by decussating fibres. And the existence of a sensory tract for the cranial nerves in the lateral portion of the formatio reticularis and lemniscus is thus determined. He claims that by this method tracts can be made out which cannot be distinguished from one another in human fœtal brains, and the drawings which accompany the article demonstrate that the simple structure of the lower brains warrants this assertion. The introduction of this new method of investigation deserves to be noticed, as it promises as fruitful results as that of any hitherto employed. M. A. S.

The Topography of the Cerebral Cortex. VICTOR HORSLEY. (*Amer. Jour. Med. Sci.*, April, 1887.)

In the absence of a comprehensive monograph on the relation between the external surface of the head and the various encephalic regions, Horsley records his personal experience, which has so far fortunately been equal to the exigencies of ten cases submitted to operation, in localizing brain lesions and determining the particular part of the skull and soft parts covering the focus of

disease. The sulci of the brain are to be regarded as landmarks of functional areas, but not as boundaries of them, evidence of this being found in the localization of the motor centres which lie on both sides of the fissure of Rolando. It is necessary, therefore, to find the position of certain convolutions as well as of the fissures and sulci. A clear account is given of the relations of the fissures, sulci, and convolutions which are concerned in motion. The results of a long series of experiments upon monkeys, conducted by Horsley and Beevor, are made the ground for numerous interesting statements regarding the extent of the motor areas upon the cortex. The view is urged that in any given part of the cortex, as minute as can be examined experimentally, there is represented a definite movement or combination of movements of a definite segment or segments of one or both of the opposite limbs; and that secondary movements are due to the subsequent invasion by the discharge of nerve energy of those portions of the cortex which lie nearest to and are in close relation to parts stimulated. There is, therefore, an overlapping of the borders of various motor centres, or, in other words, the commingling of neighboring representations of movement. This view is in harmony with the views of Exner and Luciani, now widely accepted. And in the drawings given to show the location of the face, arm, and leg motor areas of the cortex, the necessity of distinguishing absolute from relative areas is implied.

The lower third of the ant. and post. central convolutions from the precentral sulcus to the interparietal sulcus constitutes the motor area of the face; but this is subdivided into an upper anterior part, governing the upper face and angle of the mouth, a lower anterior part, governing the vocal cords, and a lower posterior part, governing the lower face and floor of the mouth. The statement is made that the exact details of the representation of the movements of the face and throat have not yet been investigated experimentally, hence the facts given are new; but to the further statement that clinical observation has not filled up the blank we may justly take exception, as well as to the further statement that clinical observation of the effects of disease furnishes but barren results. For the case of Amidon, of a small lesion in the facial area producing spasm of the upper lip and cheek, and the case of Krause, of localized spasm and paralysis of the vocal cord produced by a small lesion in the facial area, had demonstated, at least three years ago, that such a subdivision of the general facial area was possible.

The middle third of the anterior and posterior central convolutions governs the upper limb, but its motor area also extends into the middle frontal gyrus, where it is blended with that of the head and neck, and into the superior frontal gyrus, where it is blended with that of the leg. In this area the shoulder is centred in its upper part, the elbow next below and posteriorly, the wrist next below and anteriorly, the fingers

next below and anteriorly, the thumb lowest and posteriorly. Viewing the movements of the limb as a whole, he finds that there is hardly one in which the elbow and wrist do not take part, while the wrist and elbow are rarely moved alone. Hence absolute centres for their movement are not extensive, but relative centres are quite widely distributed. He claims that the subdivision of the motor area for the arm is confirmed by cases of cortical tumor which he has operated upon, the beginning of the spasm in each case being different. In one case the fit began with flexion of the shoulder, and the tumor was on the upper part of the arm area. In another the fit began in the thumb and the tumor was found in the lower part of the arm area.

The motor area for the lower limb is very extensive, including the posterior sixth of the superior frontal gyrus, the upper third of the central convolutions, the paracentral lobule, and the superior parietal lobule as far back as the parieto-occipital fissure. The anterior part of this region governs combined motions of the leg and arm, the middle part of the leg alone, the great toe being represented in the paracentral lobule. Further subdivision of this region is reserved for another paper. But cases are cited which prove that such a subdivision is probable, spasm and paralysis limited to the great toe having been in two cases the early symptom of lesion in the paracentral lobule. The movements of the head and neck, with that of conjugate deviation of the eyes, are governed by the area lying in the posterior part of the three frontal convolutions—a conclusion which confirms the statement of Munk, reached six years ago, to which, however, no allusion is made.

Having thus determined the exact location of the motor areas of the cortex, the topographical relations of these to the skull is considered. The fissure of Rolando is first located, according to Thane's method. The length of the middle line of the head, from the root of the nose to the occipital protuberance, is taken and halved. One-half inch behind the centre point of this line, the upper end of the fissure of Rolando is found in adults. The angle made by the fissure with the middle line is sixty-seven degrees. A strip of flexible iron having an arm attached at its middle, the arm making an angle of 67° with the strip, is used as a means of measurement, and when the strip is laid upon the middle line of the head and the junction of the arm and strip placed over the theoretical situation of the upper end of the fissure of Rolando, the arm lies over the fissure. But as the fissure of Rolando bends slightly backward in its lower third, the arm of the instrument indicates only the upper two-thirds of the fissure. The fissure of Sylvius is next located. It commences at the pterion, and passes upward and backward as far as the highest point of the squamo-parietal suture, whence it curves slightly upward toward the centre of the parietal eminence which it nearly reaches. The pterion is half-way between the stephanion and the upper border of the

zygoma, the measurement being taken along a line drawn vertically to the zygoma from the stephanion. The stephanion is the point where the temporal ridge crosses the coronal suture, both of which can be readily made out by steadily pressing the scalp with the thumb over their supposed sites. If the coronal suture cannot be felt, there can be felt a rounded ridge bounded by two grooves, and the suture lies in this ridge. The highest point of the squamo-parietal suture is under the temporal muscle in a vertical line drawn in front of the articulation of the lower jaw, being at the point at about the junction of the upper and middle thirds of the distance between the ridge of the temporal muscle and the upper border of the zygoma. The anterior branch of the fissure of Sylvius runs upward and forward from the pterion, continuing, as it were, the line of the sphenoido-squamous suture, but commencing one or two millimetres in front of it. The precentral sulcus runs parallel to and just behind the coronal suture, and reaches to about the centre of the fissure of Rolando; from it diverges the inferior frontal sulcus about opposite to the superior temporal ridge. The superior frontal sulcus commences in the ascending frontal convolution about midway between the fissure of Rolando and a line continued upward in the line of the precentral sulcus. The inter-parietal sulcus, which forms the posterior boundary of the motor area, can be located after the position of the fissures of Sylvius and Rolando are known; for it begins opposite the knee-like bend in the fissure of Rolando, and turns backward just below the horizontal level of the superior frontal sulcus. Here it lies midway between the fissure of Rolando and the centre of the parietal eminence. Further up, as it passes backward, it lies midway between the longitudinal fissure and the centre of the parietal eminence. The parieto-occipital fissure lies just in front of the lambdoid suture. Having found the fissures and sulci, the situation of the convolutions can be readily determined. M. A. S.

PHYSIOLOGY (INCLUDING PHYSIOLOGICAL PSYCHOLOGY).

The Time Taken up by Cerebral Operations. (*Mind*, April, July, and October, 1886.)

Dr. J. M. Cattell, in the psychological laboratory at Leipsic (Wundt's), has made a re-determination of the reaction-time for various mental processes, and claims to have used improved methods of recording, and to have eliminated errors that have formerly been made in making out the averages. The times were recorded by a Hipp chronoscope, which was controlled by an instrument devised by Cattell and called the gravity-chronoscope, by means of which the error (sometimes amounting to one-tenth sec.) due to the time consumed in magnetizing and demagnetizing the electro-magnet of the Hipp instrument is eliminated. For obtaining the correct average, he has used a different method from that used by Exner, Merkel, and others. A reaction may vary so from the average that the whole series will have a false value. Exner